



Government of South Australia  
Department of Health

SOUTH AUSTRALIAN  
INTEGRATED MOSQUITO MANAGEMENT STRATEGY  
S A I M M S



Prepared by the Environmental Health Service, Department of Health

**STRATEGIC DIRECTIONS PAPER**

**January 2007**





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South Australian Integrated Mosquito Management Strategy

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## Abbreviations

<b>AIEH</b>	Australian Institute of Environmental Health (SA Branch)
<b>AQIS</b>	Australian Quarantine & Inspection Service
<b>BFV</b>	Barmah Forest virus
<b>CDCB</b>	Communicable Disease Control Branch (Department of Health)
<b>CFS</b>	Country Fire Service
<b>DEH</b>	Department of Environment & Heritage
<b>DH</b>	Department of Health
<b>DOHA</b>	Department of Health & Ageing (Commonwealth)
<b>DPC</b>	Department of Premier & Cabinet
<b>DTEI</b>	Department for Transport, Energy & Infrastructure
<b>DWLBC</b>	Department of Water, Land & Biodiversity Conservation
<b>EHS</b>	Environmental Health Service (Department of Health)
<b>EIS</b>	Environmental Impact Statement
<b>EPA</b>	Environmental Protection Authority
<b>ERD</b>	Environment, Resources & Development
<b>ESS</b>	Environmental Services Section (Department of Health)
<b>IPM</b>	Integrated Pest Management
<b>JEV</b>	Japanese encephalitis virus
<b>LG</b>	Local Government
<b>MVEV</b>	Murray Valley encephalitis virus
<b>NRMB</b>	Natural Resource Management Boards
<b>PIA</b>	Planning Institute of Australia
<b>PIRSA</b>	Primary Industries & Resources SA
<b>RRV</b>	Ross River virus
<b>SES</b>	State Emergency Services

# 1. Introduction

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## The South Australian **I**ntegrated Mosquito Management Strategy (SAIMMS) ~ it's all about the "**I**".

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The South Australian Integrated Mosquito Management Strategy (SAIMMS) process was initiated due to the need to promote and integrate mosquito management practices throughout SA to ensure that these programs are as effective, economical and environmentally sensitive as possible.

The key concept here is **integration**. Significant gains can be achieved from making integrated mosquito management practices a priority and from collaboration across agencies in ecologically sustainable development and activities that give due regard to the human - environment interface.

### Why do mosquitoes need to be managed?

Immediate health risks associated with mosquitoes in South Australia include Ross River virus (RRV), Barmah Forest virus (BFV), nuisance impacts, and to a lesser extent Murray Valley encephalitis virus (MVEV).

Climate change brings the potential for additional disease threats in the future; including exacerbation of current threats posed by RRV, BFV and MVEV as well as the introduction of new vectors and diseases such as dengue, Japanese encephalitis virus (JEV), malaria, and West Nile virus (WNV). While some of these threats may seem unlikely now, the risks need to be identified and managed in light of the serious consequences posed by their introduction and establishment in South Australia.

### Who are the main players?

Everyone has a responsibility to help manage the risks posed by mosquitoes, however the key players include:

- The community
- Landowners / managers
- Local Government
- State Government
- Commonwealth Government
- Others such as research institutions, tourism interests

The Local, State and Federal Government agencies referred to throughout this strategy have key identifiable legislative, regulatory and community responsibilities which may impact on, or be impacted upon by mosquito management practices, quite often both.

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## The “I” in “SAIMMS” means **I**ntegration of agencies, policies, *and* programs

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Integration refers to both agencies and programs working together – identifying and harnessing synergies (for example, sharing resources; reducing duplication) – which result in more efficient and effective management of the risk of mosquito-borne disease and nuisance impacts. It means individual agencies working together to enable, as far as is practicable, each agency’s mosquito related policies and programs to be consistent with, and further each other’s aims and objectives.

Successful and ongoing integration of agencies, policies, and programs is expected to lead to what we may confidently call “best practice” mosquito management. This requires a professional commitment at all levels; each stakeholder needs to understand why integration is important and how to go about making sure it happens - how to get integration incorporated into the decisions made and the activities undertaken as a consequence. In turn Managers need to ensure agency staff and contractors are conscious of, and accountable for these decisions and activities, and the impact they may have on the activities of others and the environment at large.

To achieve these objectives, the key stakeholders (those with ‘stewardship’ to ensure SAIMMS is implemented) need to perform quite a challenging juggling act: identifying and balancing the often competing interests of environmental, economic, and public health considerations. This juggling act need not and indeed *should not* be performed in isolation.

The SAIMMS framework provides a means to encourage ongoing communication and collaborative action between agencies; it also identifies a series of Guiding Principles, and provides models to guide and facilitate this balancing act.

Additionally, the SAIMMS’ companion document, “*Integrated Mosquito Management Resource Package, 2006*”, provides advice and information on “best practice” mosquito management, including information on chemical/microbial/physical mosquito control and implications, emerging new products and techniques; and personal, household and community protection practices. This information resource is aimed at all “mosquito management practitioners” and affiliated professionals.

### **Acknowledgement**

The SAIMMS strategy document, together with the companion document “*Integrated Mosquito Management Resource Package, 2006*” are the result of the efforts and input of representatives appointed by 15 agencies with a key interest in mosquito management. Their assistance to ensure the completeness and accuracy of content is greatly appreciated.

Agency and representative details are provided in *Appendix 1* of this document.

## 2. Recommendations

### **Comment**

*An integrated approach to mosquito management cannot occur without active participation and commitment from key stakeholder agencies.*

*An agreed documented understanding of roles and responsibilities together with a detailed strategy / activity list for each key stakeholder is provided in Section 4 of this document. The number of strategies listed is large given that they cover each agency's role in prevention, development, forward planning, treatment, control, training/education, public awareness, communications and research.*

***The more significant strategies are highlighted in the Executive Summary section of this document.***

### **Recommendation 1**

- 1.1 That stakeholders/agencies adopt and implement their relevant strategies and actions as detailed in Section 4 of this document.
- 1.2 That in rolling out the various strategies, agencies make reference to other stakeholder groups as indicated to ensure integration of policies, practices and programs.
- 1.3 That agencies aim to implement the strategies within the timelines listed.
- 1.4 That agencies regularly review their progress and achievements against the strategies/programs detailed.

### **Comment**

*A model (refer page 9) has been developed to readily show the pathways and relationships between mosquito control activities, personal protection and treatment.*

*Four principles are associated with this model; these are:*

1. *Avoid human and domestic animal presence in mosquito-prone areas where possible to minimise exposure.*
2. *Utilise personal/household protection measures to reduce the risk of mosquito bites and mosquito-borne disease including promotion of 'living with mosquitoes'.*
3. *Only control / treat when avoidance and protective measures do not effectively protect human / animal health or wellbeing.*
4. *Minimise impact to the environment and the economy of any control / treatment measures implemented.*

### **Recommendation 2**

That the principles and model entitled "Avoidance, personal protection and treatment for integrated mosquito management" detailed at page 9 be promoted as a best practice model for control, personal protection and treatment of mosquitoes in an integrated manner that takes into account environmental, health, wellbeing and economic factors.

### **Comment**

*A model (refer page 10) has been prepared to provide direction on balancing health and environmental impacts within the planning and development context. The model addresses two perspectives, the first being eliminating/avoiding risk, and the second reducing risks.*

*The principle that guides this model is:-*

- *Strive to balance both health and environmental interests through careful consideration of the potential impacts of mosquitoes throughout all levels of the planning and development process*

### **Recommendation 3**

That the principle and model entitled “Planning, Design and Administrative Controls for Integrated Mosquito Management” detailed at page 10 be promoted as a best practice model for balancing health and environmental factors within the planning and development context.

### **Comment**

*A document entitled “SA Integrated Mosquito Management Resource Package, 2006” has been produced to provide practitioners with a guide for best practice mosquito management. The Package includes information covering:-*

- *Health impacts of mosquitoes in SA (including RRV, MVEV, nuisance)*
- *Possible future disease threats for SA*
- *Climate change and mosquitoes*
- *Chemical, microbial and physical control treatments and implications*

### **Recommendation 4**

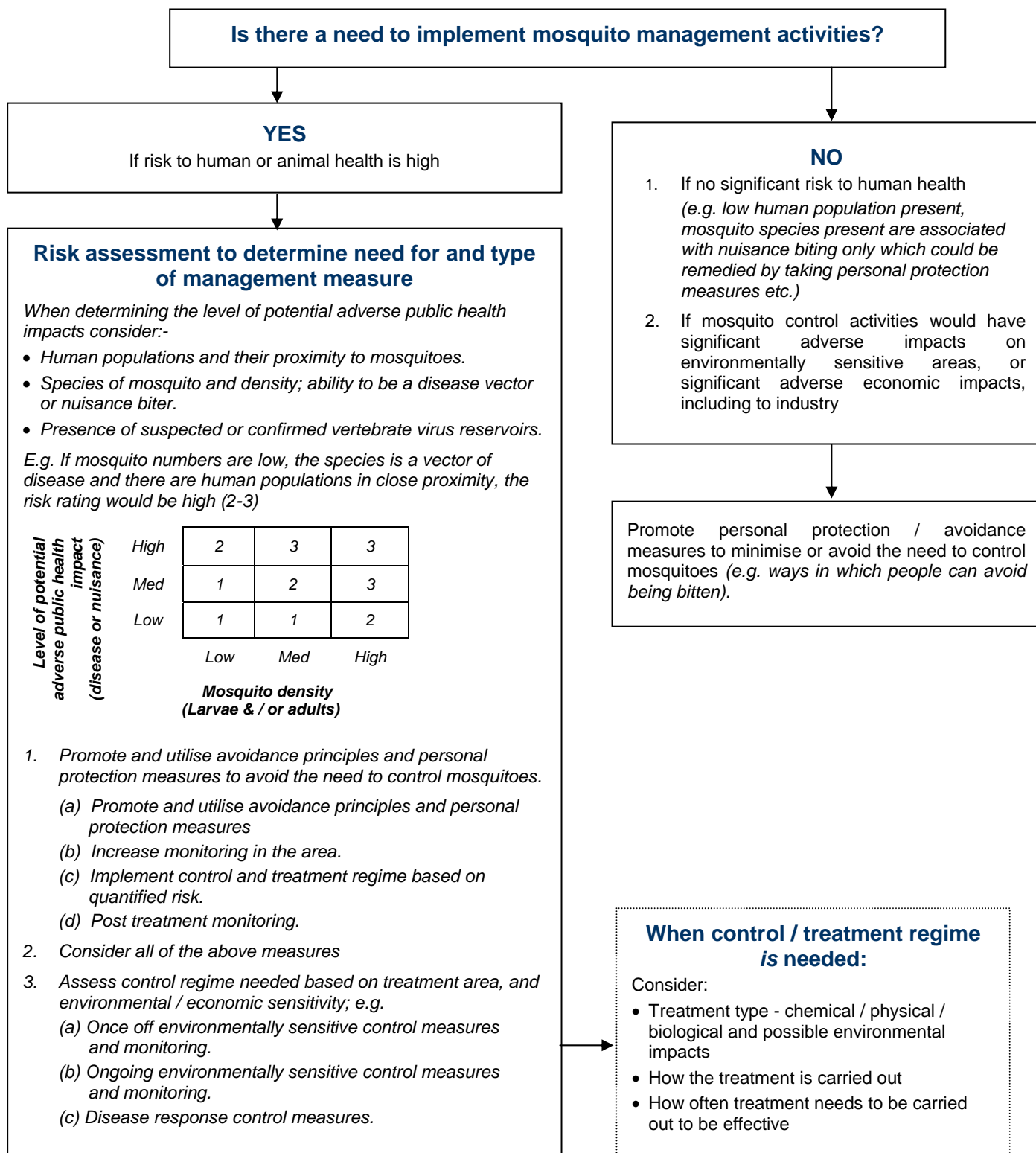
That the booklet entitled “SA Integrated Mosquito Management Resource Package, 2006” be promoted within South Australia as a practitioner’s information resource and guide to best practice in mosquito management.

# Avoidance, Personal Protection and Treatment for Integrated Mosquito Management

## Principles:

1. Avoid human and domestic animal presence in mosquito-prone areas, where possible, to minimise exposure.
2. Utilise personal/household protection measures to reduce the risk of mosquito bites and mosquito-borne disease, including promotion of the concept of 'living with mosquitoes'.
3. Only control / treat when avoidance and protective measures do not effectively protect human / animal health or wellbeing.
4. Minimise impact to the environment and the economy of any control / treatment measures implemented.

## Model:



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# Planning, Design and Administrative Controls for Integrated Mosquito Management

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## Principles

Strive to balance both health and environmental interests through careful consideration of the potential impacts of mosquitoes throughout all aspects of the planning and risk management process.

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### 1. Eliminating /avoiding risk using:

#### 1.1 Planning controls

For example:

- Preventing the creation of potential 'new' breeding sites during construction and infrastructure development, e.g. through the appropriate design of permanent or temporary retention/detention basins.
- Consideration given to the appropriate location of 'people-intensive' development and activities such as residential areas, schools, hospitals, child and aged care facilities, light industry, tourism, and recreational.
- Consideration given to the location of animal intensive areas and development or activities, e.g. animal husbandry such as cattle lots, chicken farms.
- Zoning to help protect the community against inappropriate development and activities, e.g. avoiding people-intensive development in close proximity to mangrove/salt marsh regions.

#### 1.2 Administrative controls (legislation, policy, guidelines.)

For example:

- Planning/activity approval in high-risk areas dependent on developer/tourism operator undertaking a risk management/IMM plan, including provisions for long-term funding where necessary, e.g. compulsory insect screens to be installed and developer to identify means of funding on-going mosquito management/control measures if development/activity is to go ahead in an identified high-risk/mosquito-prone area.
- Penalties for existing breeding sites or the creation of potential new breeding sites, e.g. through the provisions for 'insanitary conditions giving rise to a health risk' in the Public and Environmental Health Act.
- Inclusion of mosquito-related issues in National/State accreditation programs for tourism operators.

### 2. Reducing risk through:

#### 2.1 Engineering and design controls

For example:

- Source mitigation, e.g.
  - Appropriate and adequate design and maintenance of stormwater systems.
  - Consideration of surface water implications such as irrigation and tidal inundation.
- Ensuring due regard for potential human health impacts of activities affecting riverine/floodplain/estuary ecosystems.
- Forward design consideration to avoid negative mosquito impacts such as the inclusion of appropriate lighting and vegetation screens.

#### 2.2 Forward planning

For example:

- Planning for episodic events, e.g. floods.
- Expected impacts of climate change.

#### 2.3 Consultation and education

For example:

- Planners consulting with Environmental Health professionals.
- Educating town planners, property developers, vendors, tourism operators, event coordinators and the community in regards to mosquito aware design and construction.
- Incorporating mosquito related issues into tertiary curricula for Town Planners, Environmental Health Officers, and Event Co-ordinators.

#### 2.4 Adequate monitoring

For example:

- On-going surveillance/monitoring activities to determine factors such as:-
  - Species type, e.g. are mosquitoes present that are vectors of disease or likely to create nuisance only? Does species type vary seasonally?
  - Abundance, e.g. is mosquito density variable seasonally? Are numbers similar on a year-to-year basis?
  - Effectiveness of any control regimes and possible off-target effects, e.g. which form of control is necessary/most effective for that particular area? Is the treatment suited to the particular environment?
  - Variability in water presence, e.g. is water available in breeding areas all year round or at certain times of the year only?
  - Are preventative actions, i.e. insect screens and personal protection sufficient to reduce the risk of mosquito-borne disease?

### 3. Executive Summary

The need to achieve a more integrated approach to mosquito management is evidenced by the willingness of Agencies to come together to develop the framework and the content for how mosquito related policies, programs and practices can be incorporated and integrated to achieve improved health and environmental outcomes for the South Australian community.

Four (4) recommendations are detailed in Section 2 of this document; they can be summarised as:-

1. A call for agencies to adopt and implement the strategies and actions detailed in Section 4 of this report
2. The adoption and promotion of the model for “Avoidance, Personal Protection and Treatment for Integrated Mosquito Management “ (refer page 9)
3. The adoption and promotion of the model for “Planning, Design and Administrative Controls for Integrated Mosquito Management” (refer page 10)
4. The promotion of the “SA Integrated Mosquito Management Resource Package, 2006” as a practitioners’ information resource and guide to best practice in mosquito management.

The strategies and actions listed in Section 4 of this report (refer recommendation 1) have been sequenced on an agency by agency basis for readability and to clearly define and align roles and responsibilities. This structure enables each key stakeholder group to readily identify the part that their agency plays in the bigger picture of integrated mosquito management throughout South Australia.

#### ***Highlights of the strategies***

- Predictive models of increased arbovirus activity and presence of nuisance mosquitoes to be developed. Separate models are expected for (1) metro, outer-metro & country coastal/ salt-marsh/ mangrove areas, (2) Riverland, (3) South East and (4) inland areas subject to flooding /inundation. The models are to provide clear indicators of when and where to consider taking pre-emptive and/or ongoing management activities in response to increased levels of arbovirus activity and nuisance populations of mosquitoes.

*DH to lead and contract the development of the models with agencies to contribute data – refer 6.1*

- Mosquito management contingency plans for flooding events, incursions of exotic mosquito species & arbovirus/mosquito-borne disease outbreaks to be developed and include inter and intra agency communications protocols and resource pool listings.

*DH, NRMB and AQIS shared lead – refer 6.13, 7.6, 13.5*

- Evidence of mosquito-borne disease to be monitored through arbovirus transmission notifications and investigations, followed by strategies to manage arbovirus outbreaks.

*DH leads with Councils playing a role in investigations- – refer 3.2, 6.2*

- Increased sharing of data and knowledge across agencies and interagency collaboration. DH to gather and centralise data for sharing and map known mosquito populations across the State as a precursor to identifying ‘mosquito-prone areas’. Consideration to be given to developing GIS applications to support mapping. Key stakeholder reference group to be formed to meet at least annually to provide a forum to share ideas, update knowledge,

discuss trends and review progress with strategies. Mosquito information session for local government Environmental Health Officers & other stakeholders to be held at least bi-annually.

*DH to lead with input from all agencies – refer 6.5*

*Flinders University available for GIS database development consultancy service – refer 16.8*

- Best practice control / treatment procedures to be promoted through provision of advice that supports pre and post treatment monitoring regimes and guides selection of effective and environmentally sensitive control options.

*Agencies to provide advisory role LG, DEH, EPA, DH, NRMB, PIRSA, DWLBC, Uni SA - refer 3.13, 4.8, 5.4, 6.14 & 6.17, 7.9, 9.4, 12.6, 18.7*

- All agencies to implement surveillance and monitoring activities and apply control and treatment practices that minimise negative health / environmental impacts for land / resources under their care or control, including wetlands and first ports (land and sea).

*All agencies to monitor and manage land under their care or control or where they have responsibility for mosquito management on that land*

- Sentinel flocks / herds / devices which act as an early warning system for arbovirus activity are to be continually monitored. It is noted that PIRSA currently has sentinel horse populations at various sites and AQIS uses sentinel tyre traps at international seaports and airports.

*PIRSA & AQIS to continue programs, - refer 9.2, 13.3,*

*DH to consider need for sentinel flocks 6.6*

- ‘Mosquito-prone’ areas to be identified to better advise mosquito aware zoning of areas for development.

*DH, LG and Planning SA to carry out jointly – refer 6.7, 3.8, 8.4*

- Review of urban and rural planning procedures and guidelines to be initiated to ensure incorporation of ‘mosquito aware’ design and construction guidelines for developments in mosquito-prone areas.

*DH to initiate project with LG and Planning SA participation – refer 6.8, 3.7, 8.3*

- All agencies to play a role in managing the human-mosquito interface, covering health and environmental interests; for example by incorporating mosquito risk assessments into Environmental Impact Statements, opening lines of communication between Town Planners and Environmental Health professions, sharing knowledge etc.

*All agencies to play a role in managing the human-mosquito interface*

- Practitioners’ mosquito management awareness and knowledge to be improved through supply of information, training and resources; for example “*Integrated Mosquito Management Resource Package, 2006*” to be supplied to Environmental Health Officers, Town Planners and relevant professional bodies and to universities for incorporating into tertiary curricula for Town Planners and EHOs.

*DH to develop and deliver resources – refer 6.12 & 6.19*

*Universities to include in training / curriculum – refer 16.3, 18.5, 19.2*

- Health promotion activities (e.g. “*Fight the Bite*” campaign) to be undertaken as required to improve community awareness and understanding of mosquitoes, mosquito-borne disease and personal/household protection measures.

*DH to lead promotional activities, with Councils to promote within their areas – refer 6.20, 3.13*

- Strategies to be employed to promote learning to live with mosquitoes through environmental management and minimising human interaction with mosquito populations, e.g. personal protection.

*LG, DH and NRMB shared lead – refer 3.5, 6.4, 7.2*

- Risk assessments of new and existing wetland areas, both natural and man-made to be undertaken with DWLBC to provide watercourse management guidelines.

*LG, DEH and DWLBC shared lead – refer 3.9, 4.4, 12.3*

- Continuation of state subsidies for mosquito management activities carried out by local Councils.

*Administered by DH – refer 6.18*

#### **Research projects also identified:**

- Increased surveillance and monitoring to establish species / abundance data throughout SA.

*DH to initiate with other agencies to contribute data- refer 6.21*

- Viral analysis/monitoring of presumed reservoir vertebrate species and mosquito vectors.

*DEH & DH to share lead, PIRSA to contribute - refer 4.10, 6.23 & 9.6*

*Universities may provide a consultancy service when approached for research – refer 16.7, 18.11, 19.5*

- Potential arbovirus reservoir and vector species / vector competence studies.

*Universities may provide a consultancy service when approached for research – refer 16.6, 18.10, 19.3*

- Study into chemical / physical / biological control methods and outcomes encompassing adverse effects of pesticides, effectiveness of current and potential control methods and off-target impacts of control measures.

*Both EPA & PIRSA to carry out research - refer 5.5, 9.5*

- Epidemiological studies of mosquito-borne diseases, particularly in relation to climate variability and density of mosquito populations in SA, e.g. Uni of Adelaide have recently undertaken a study into transmission of RRV in SA

*DH to establish research area needs – refer 6.22, 19.4*

The strategies developed via the SAIMMS project support **South Australia’s Strategic Plan Objective 2, Improving Wellbeing**, “*improving our quality of life and wellbeing of the community and individual citizens*”.

Thanks go to the Commonwealth, State and Local government agencies, professional organisations, tertiary institutions and others that contributed to this project and the development of strategies through membership of the **SAIMMS Working Group** (membership details are provided as Appendix 1 to this document).

## 4. Strategies by Stakeholder

### 1. Individuals

#### *Roles and responsibilities in relation to mosquito management*

1. General awareness / knowledge of mosquito-borne disease and prevention strategies
2. Avoiding mosquito-prone areas where possible
3. Application of personal / household protection measures (e.g. apply repellents, maintain/screen buildings to exclude mosquitoes from the inside environment)
4. Elimination of potential breeding sites around the home

### 2. Land Owners

#### *Roles and responsibilities in relation to mosquito management*

1. General awareness / knowledge of mosquito-borne disease and prevention strategies
2. Appropriate location of residential, industry and other facilities away from mosquito prone areas
3. Application of personal /household protection measures and adherence to specific OHS&W provisions (e.g. encourage use of repellents, maintain/screen buildings to exclude mosquitoes from the inside environment)
4. Avoiding the creation of potential breeding sites from development or activities
5. Monitoring and managing property (e.g. homes, industry, wetlands etc.) and applying appropriate treatment / control measures if necessary and removing / managing mosquito breeding sites

### 3. Local Government (Councils)

#### ***LGA Comment***

The impacts of mosquitoes vary considerably across local government areas. Certain areas of South Australia have been identified as being 'mosquito-prone' and understandably these Councils have a greater role to play in integrated mosquito management in comparison to Councils that do not experience increased breeding and mosquito presence. While some Councils find it necessary and indeed beneficial to have an identified and operational mosquito surveillance and control program, promotional/educational activities and one-off 'spot treatments' may suffice in other Council areas. It must be recognised, however, that mosquitoes do not recognise nor respect Council boundaries and trends in mosquito populations can change from year to year. All local Councils are therefore encouraged to play a role, be it big or small, in integrated mosquito management.

#### ***Roles and responsibilities in relation to mosquito management***

1. Provision of local services and support to residents in areas such as planning and building, pest control and public health
2. Manage council land for community benefit including mosquito surveillance and control where necessary
3. Forming mosquito management regions where appropriate, e.g. Riverland and South East areas
4. Knowledge of local mosquito-prone areas and species present
5. Public education and promotion of personal / household protection measures
6. Appropriate zoning of land
7. Consideration of mosquito related issues in planning and development processes
8. Develop and maintain consultation and cooperation between Local, State and Commonwealth Government and relevant agencies
9. Instruct contractors (e.g. pest controllers, Mosquito Research Lab) to undertake site-specific monitoring and control to guide and define integrated mosquito management (IMM) across the local area

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
3.1	Prevention / Research	Assist development of predictive models of when mosquito populations are likely to increase and lead to peaks in disease	Assist	<ul style="list-style-type: none"> <li>Request reports and raw data when mosquito surveillance and control activities are provided by a contractor</li> <li>Data collection, e.g. mosquito species and abundance through larval dipping, adult trapping</li> <li>Provision of data to DH</li> </ul>	(Lead: 6.1 DH)	Ongoing	
3.2	Prevention	Arbovirus transmission notifications and investigations (as required under the <i>Public and Environmental Health Act 1987</i> )	Investigate	<ul style="list-style-type: none"> <li>Investigate disease outbreaks</li> <li>Liaise with DH to implement strategies to manage arbovirus outbreaks</li> </ul>	(Lead: 6.2 DH)	Ongoing	
3.3	Prevention	Mosquito surveillance & monitoring activities	Joint Lead	<ul style="list-style-type: none"> <li>Surveillance &amp; monitoring within Council boundaries</li> <li>Implement event based monitoring (e.g. after summer storms when increased breeding is suspected) with coordination/direction from DH</li> <li>Contribute to a pool of expertise and materials towards improved mosquito monitoring</li> <li>Participate in implementation of contingency plans for one-off events, e.g. flooding</li> <li>Consider ways to improve mosquito management; e.g. advantages of regional management groups/practices</li> </ul>	(Joint Lead 6.3 DH)	Ongoing	
3.4	Prevention	Monitoring & management of wetland areas	Lead / Surveillance	<ul style="list-style-type: none"> <li>Seek information where required about the design and management of wetland areas, e.g. DWLBC, DEH</li> <li>Monitor and manage wetlands under the care and control of Council</li> <li>Keep a close watch on private wetlands and investigate mosquito-related complaints</li> <li>Provide information to landowners about appropriate wetland management</li> </ul>	Landowners (Refer : 4.1 DEH for state managed land)	Ongoing	

3.5	Prevention	Promoting learning to live with mosquitoes through environmental management and minimising human interaction with mosquito populations	Joint Lead	<ul style="list-style-type: none"> <li>• Distribute promotional material, e.g. Fight the Bite pamphlets &amp; posters, Council specific resources</li> <li>• Provide information &amp; advice to the public, agencies &amp; businesses on the role of mosquitoes in the environment &amp; appropriate personal/household protection measures</li> </ul>	<i>(Joint Lead: 6.4 DH &amp; 7.2 NRMB)</i>	Ongoing	
3.6	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Provide advice and share knowledge with other stakeholders</li> <li>• Contribute data/information to central data storage (DH)</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH) All agencies</i>	Ongoing	
3.7	Management	Managing the human-mosquito interface, covering health & environmental interests	Joint Lead	<ul style="list-style-type: none"> <li>• Consider guidelines for 'mosquito aware' design and construction in mosquito-prone areas, e.g. promotion of screening for buildings</li> <li>• Consider major development approvals being dependant on adequate mosquito management plans in mosquito-prone areas</li> <li>• Town planners consulting with Environmental Health Professionals when development is proposed in mosquito-prone areas</li> <li>• Liaise with the Planning Institute of Australia</li> </ul>	<i>(Joint Lead: 6.8 DH &amp; 8.3 Planning SA)  (Joint Lead: 6.9 DH) (8.4) Planning SA</i>	Feb 2007	
3.8	Regional and Urban Planning	Mosquito aware zoning of areas for development	Joint Lead	<ul style="list-style-type: none"> <li>• Consult with DH when zone changes are proposed for mosquito-prone areas</li> <li>• Undertake Health Impact Assessments when residential zoning is proposed for mosquito prone areas</li> <li>• Consult with Planning SA</li> </ul>	<i>(Joint Lead: 6.7 DH &amp; 8.3 Planning SA)</i>	Initiated by Dec 2006 then ongoing	
3.9	Regional and Urban Planning	Risk Assessments of new and existing wetland areas, both natural and man-made	Joint Lead	<ul style="list-style-type: none"> <li>• Seek advice from appropriate agencies to undertake risk assessments</li> <li>• Document and review risk assessment procedures</li> </ul>	<i>(Joint Lead: 4.4 DEH &amp; 12.3 DWLBC)</i>	Project 2006 then ongoing	
3.10	Regional and Urban Planning	Review of policies, practices & plans to ensure they are 'mosquito aware'	Review	<ul style="list-style-type: none"> <li>• Identify &amp; review stormwater management documents including those in relation to water sensitive urban design</li> <li>• Review planning procedures to incorporate 'mosquito aware' design</li> </ul>		Ongoing	

3.11	Treatment	Implement pre and post treatment monitoring regime.	Lead (within Council area)	<ul style="list-style-type: none"> <li>• In areas of high mosquito density where control is necessary, pre and post treatment monitoring to be implemented</li> <li>• Determine factors such as predator species presence, vegetation type and abundance, mosquito species and abundance</li> <li>• Consider establishing site &amp; species specific thresholds</li> <li>• Consider the need for EIS (EPA)</li> </ul>	(Joint Lead: All Agencies)	Ongoing	
3.12	Treatment	Assess and select best and most environmentally sensitive control option(s)	Lead (within Council area)	<ul style="list-style-type: none"> <li>• Consult with DH/Mosquito Research Lab to determine appropriate treatment regime</li> <li>• Consider environmentally appropriate landscape modification</li> <li>• Selection of environmentally sensitive larvicides</li> <li>• Use trained operators with up-to-date knowledge</li> <li>• Assess the effectiveness of the control program e.g. cost versus benefit, environmental impact versus benefit</li> </ul>		Ongoing	
3.13	Awareness	Provide advice and mosquito awareness to the community	Lead (within Council area)	<ul style="list-style-type: none"> <li>• Community advice &amp; awareness of mosquito related risks (disease transmission) &amp; role in the environment</li> <li>• Distribute Council specific mosquito resources or 'Fight the Bite' program resources</li> </ul>	Community (6.20) DH	Ongoing	
3.14	Research	Increased surveillance and monitoring to establish species / abundance data throughout SA	Contributor	<ul style="list-style-type: none"> <li>• Implement mosquito surveillance and control programs in local council areas</li> <li>• Contribute mosquito surveillance data to central data storage (DH)</li> </ul>	(6.21) DH	Ongoing	

## 4. Department of Environment and Heritage

### *DEH Comment*

The Department of Environment and Heritage is responsible for environment policy, biodiversity conservation, heritage conservation, environmental sustainability and animal welfare, and is a custodian of information and knowledge about the State's environment. The Department also manages land held in the conservation reserve system and Crown lands. Although not primarily responsible for mosquito management, the DEH plays a role in mosquito management on public land, and the impacts of mosquito management in general on the environment, conservation and biodiversity.

### *Roles and responsibilities in relation to mosquito management*

1. Provide strategic direction for ecosystem conservation
2. Wetland inventories to document the conservation value of wetlands, e.g. Ramsar Convention (to assess environmental significance of the site and hence to treat or not treat)
3. Various aspects of coastal and marine matters including coastal management, vegetation, marine, estuary and wildlife conservation and environmental reporting
4. Responsible for the allocation, management and tenure administration of Crown Lands
5. Educating the general public and land owners (including Crown) about mosquito activity
6. Management of parks, including areas of recreation, conservation and wilderness protection
7. Indigenous heritage issues and Land Use Agreements

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
4.1	Prevention	Monitoring & management of wetland areas	Lead (state/ crown lands)	<ul style="list-style-type: none"> <li>• Inventory of wetlands</li> <li>• Biological survey unit to conduct inventory of invertebrates</li> </ul>	<i>(Refer 3.4 LG for land within Council boundaries)</i>	Ongoing	Various
4.2	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Share mosquito related data</li> <li>• Consider capacity to collect/ maintain wetland, coastal &amp; marine related mosquito data</li> <li>• Allow access by the public / and or other agencies to these data sets</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH) All agencies</i>	Ongoing	

4.3	Management	Managing the human-mosquito interface, covering health & environmental interests	Joint Lead	<ul style="list-style-type: none"> <li>• Encourage and maintain existing lines of communication with other agencies / Local Government and the public in relation to mosquitoes.</li> <li>• Encourage open lines of communication with the various 'arms' within the DEH in relation to mosquitoes.</li> <li>• Coastal and environmental management considering humans and mosquitoes</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	
4.4	Regional and Urban Planning	Risk Assessments of new and existing wetland areas, both natural and man-made	Joint Lead	<ul style="list-style-type: none"> <li>• Seek advice from appropriate agencies</li> <li>• Increase communication with appropriate planners and Local government</li> </ul>	<i>(Joint Lead: 3.9 LG &amp; 12.3 DWLBC)</i>	Project 2006 then ongoing	
4.5	Regional and Urban Planning	Management of parks and crown lands to minimise negative health & environmental impacts related to mosquitoes	Lead	<ul style="list-style-type: none"> <li>• Participate in planning of contingency response plans for one off events</li> <li>• Ensure Land Use Agreements reflect appropriate mosquito management strategies where appropriate</li> </ul>		Ongoing	
4.6	Treatment	Implement pre and post treatment monitoring regime.	Lead (for own property)	<ul style="list-style-type: none"> <li>• Determine factors such as predator species presence, vegetation type and abundance, mosquito species and abundance</li> </ul>	<i>(Joint Lead: All Agencies)</i>	Ongoing	
4.7	Treatment	Assess and select best (and most environmentally sensitive) control option(s)	Lead (for own property)	<ul style="list-style-type: none"> <li>• Define desired outcome of treatment regime</li> <li>• Consider environmentally appropriate landscape modification</li> <li>• Selection of environmentally sensitive larvicides</li> <li>• Use trained operators with up-to-date knowledge</li> <li>• Assess the effectiveness of the control program e.g. Achieving desired outcome, cost versus benefit</li> <li>• Participate in contingency plans for one off events</li> </ul>		Ongoing	
4.8	Awareness	Provide advice and improve awareness on mosquito related management issues	Advisory	<ul style="list-style-type: none"> <li>• Community advice &amp; awareness of mosquito related risks (disease transmission) &amp; role in the environment</li> </ul> <p>Provide advice to national park users about mosquitoes through rangers, signage, and pamphlets.</p>	Community	Ongoing	

				<ul style="list-style-type: none"> <li>• Provide advice regarding coastal, marine, vegetation and estuary matters</li> <li>• Provide advice on appropriate control options for wetland areas</li> </ul>			
4.9	Research	Increased surveillance and monitoring to establish species & abundance data throughout SA	Contributor	<ul style="list-style-type: none"> <li>• Consider increasing surveillance in SA to gather and share mosquito related data.</li> <li>• Targeted surveillance (based on disease outbreaks or complaints) of wetlands throughout SA</li> <li>• Targeted surveillance of coastal areas to determine species / abundance data.</li> </ul>	(6.21) DH Other Agencies	Ongoing	
4.10	Research	Viral analysis / monitoring of reservoir species (vertebrates) and mosquito vectors	Contributor / Joint Lead	<ul style="list-style-type: none"> <li>• Vector competency studies</li> <li>• Investigate vertebrate host species of RRV and BFV.</li> <li>• Increased and strategic viral analysis</li> <li>• Contribute to viral host macropod studies into RRV</li> <li>• Issuing of permits to conduct research with macropod species</li> </ul>	(Joint Lead: 6.23 DH)  (9.6) PIRSA Uni's, (16.7, 18.11, 19.5)	Projects, then ongoing / as required	

## 5. Environmental Protection Authority

### **EPA Comment**

The Environment Protection Authority is South Australia's primary environmental regulator, responsible for the protection of air and water quality, and the control of pollution, waste, noise and radiation. The EPA provides leadership to protect and enhance the environment by administering the Environment Protection Act 1993 and the Radiation Protection and Control Act 1982. The EPA encourages environmental responsibility by working with the community, industry and governments to achieve a healthier and prosperous environment and a sustainable future.

### **Roles and responsibilities in relation to mosquito management**

1. Primary environmental regulator for SA
2. Protection of water quality and environmental pollution control
3. Investigations of incidents that cause actual or potential serious or material environmental harm and environmental nuisance including the application of pesticides
4. Research and monitoring studies related to environmental impacts from the application of pesticides (e.g. locust spraying in the Flinders Ranges), mosquito habitats in urban wetlands and ambient water quality monitoring using aquatic macro invertebrates as biological indicators of stream health

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
5.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Feed mutually agreed/identified or other relevant info into central coordinator in DH</li> <li>• Ongoing participation in SAIMMS Committee/Group (e.g. as convened by DH quarterly or biannually)</li> </ul>	<i>(Lead: 6.5 DH) All agencies</i>	Ongoing	
5.2	Management	Managing the human-mosquito interface, covering health & environmental interests; provide advice and risk/impact assessments	Joint Lead/Advisory	<ul style="list-style-type: none"> <li>• Provide comment on developments, including wetlands proposals/plans, especially in regards to ongoing monitoring, maintenance, environmental risk mitigation strategies</li> <li>• Risk assessment of new &amp; existing wetland areas</li> <li>• Provide comment/input to DH 'mosquito aware' design &amp; construction info package</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	

5.3	Treatment	Provide advice on environmentally appropriate landscape modification and environmentally sensitive larvicides assessment of the effects of proposed control actions (e.g. in the form of EIS or similar)	Lead	<ul style="list-style-type: none"> <li>• Provide advice</li> <li>• Investigate incidents that cause actual or potential environmental harm including the application of pesticides</li> <li>• Liaise with central contact person/coordinator in DH and PIRSA Rural Chemicals (Ag. &amp; Vet. Chems) as required</li> </ul>	Other Agencies (incl. Local Government)	As required	
5.4	Awareness	Provide advice on the role of mosquitoes in the environment	Advisory	<ul style="list-style-type: none"> <li>• Post info pamphlets, etc. or link to them on EPA website</li> <li>• Send out info pamphlets, info package etc. with comments on development proposals, etc. as appropriate</li> </ul>	Other Agencies	Ongoing	
5.5	Research/monitoring	Study into chemical / physical / biological control methods & outcomes	Participate	<ul style="list-style-type: none"> <li>• Study of adverse effects of pesticide application on non-target organisms</li> <li>• Study of effectiveness of current and potential control methods</li> <li>• Study of off-target impacts of control measures, including investigation of 'incidents', on as "as needs" basis</li> <li>• Mosquito habitats in urban wetlands (e.g. 'Mosquitoes in Constructed Wetlands' (2002))</li> <li>• Ambient water quality monitoring</li> <li>• Assist with applications to secure funds for targeted research</li> </ul>	<i>Referred from other agencies e.g.( 9.5) PIRSA</i>	Ongoing / as required	

## 6. Department of Health

### ***DH Comment***

The Department of Health is committed to ensuring a quality, safe and accessible health care system, and to improving the health and well-being of all South Australians. The Department's role is to set directions, formulate policy and strategic planning, and monitor the performance of the State's health services and system - giving priority to prevention, early intervention and health promotion.

The Environmental Health Service (EHS) has a major role in developing policy and providing advice to other agencies and the public to prevent or minimise the adverse health effects of environmental hazards in the South Australian community in terms of food, air, water, soil and chemical use. The EHS monitors, controls or advises on a wide range of potential physical, chemical and biological public health hazards, including mosquitoes.

The Communicable Disease Control Branch works to prevent and control communicable diseases in the South Australian community. CDCB maintains a system of surveillance for communicable diseases and risks for disease, investigates outbreaks of communicable diseases, responds to minimise the personal and social impacts of disease, builds and maintains partnerships with communities and health care providers, and informs the community about the services it provides.

### ***Roles and responsibilities in relation to mosquito management***

1. Protecting and improving the health of all South Australian's by providing leadership in health reform, policy development and planning
2. Providing a central coordinating / initiating role in matters related to integrated mosquito management
3. Mosquito surveillance and monitoring program - Torrens Island & Environs
4. Provision of the Mosquito Management Subsidy Fund to local councils
5. Provide strategic direction for the control and prevention of disease investigation and monitoring of arbovirus activity throughout SA
6. Surveillance of mosquito-borne infections in humans
7. Conduct public awareness campaigns
8. Provide comment on Local and State Government development plans and planning amendment reports
9. Support and provide funding for mosquito related research
10. Opportunistic bleeding of sentinel chicken flocks
11. Report to National Arbovirus & Malaria Advisory Committee through Communicable Disease Network Australia
12. Licensing and education / training of pest control companies and pest management technicians

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
6.1	Prevention / Research	Develop predictive models for SA when mosquito populations are likely to increase and lead to peaks in disease. <i>(Separate models are expected for (1) metro, outer-metro &amp; country coastal/ salt-marsh/ mangrove areas, (2) Riverland, (3) South East and (4) inland areas subject to flooding /inundation)</i>	Lead	<ul style="list-style-type: none"> <li>• Capture data from identified 'high-risk' areas required to develop the models</li> <li>• DH to consider contracting a tertiary institution or other consultant to develop and document the model.</li> <li>• Ensure a training component for staff is factored into the project brief for future application/updating</li> </ul>	Local Government Uni SA DEH/DWLBC (for GIS data, vertebrate reservoir populations, etc)	Sept. 2006	
6.2	Prevention	Mosquito-borne disease transmission notifications and investigations.	Lead	<ul style="list-style-type: none"> <li>• DH (CDCB) record, monitor, analyse &amp; report on notifications received</li> <li>• DH (ESS) to contact &amp; advise Councils on appropriate procedures, monitoring and control regimes to follow.</li> <li>• DH (CDCB) to advise Medical Practitioners when clusters of RRV and BFV occur in their area</li> <li>• CDCB to advise ESS when clusters occur anywhere in the State</li> </ul>	Medical Practitioners (3.2) Local Government	Ongoing	
6.3	Prevention	Mosquito surveillance & monitoring activities	Joint Lead	<ul style="list-style-type: none"> <li>• Implement event-based monitoring (e.g. after summer storms when increased breeding is suspected)</li> <li>• Contribute to a pool of expertise and materials towards improved mosquito monitoring</li> <li>• DH (Regional Services) surveillance &amp; monitoring in unincorporated areas</li> <li>• DH / ESS surveillance and monitoring activities in Torrens Island and environs.</li> </ul>	<i>(Joint Lead: 3.3 LG)</i> Uni SA SA Water AQIS NRMB DOHA	Ongoing	
6.4	Prevention	Promoting learning to live with mosquitoes through environmental management and minimising human interaction with mosquito populations	Joint Lead	<ul style="list-style-type: none"> <li>• Delivery of SAIMMS document and implementation of strategy</li> <li>• Development and distribution of educational / promotional material</li> <li>• Provide advice to other agencies &amp; the public</li> <li>• Review and update SAIMMS document as required to ensure the document remains up-to-date and relevant</li> </ul>	<i>(Joint Lead: 3.5 LG &amp; 7.2 NRMB)</i>	Ongoing  First review due 2008	

6.5	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Lead	<ul style="list-style-type: none"> <li>• Determine data needs and collection format</li> <li>• Gather and centralise specific data</li> <li>• Central data repository accessible to all</li> <li>• Consider displaying data via the WWW.</li> <li>• Form key stakeholder reference group (to meet at least annually)</li> <li>• Organise a mosquito information session for local government EHOs &amp; other stakeholders at least bi-annually</li> </ul>	(18.12) Uni SA All agencies	Implemented by 2006 then ongoing	
6.6	Prevention	Consider implementing sentinel flocks/devices	Lead	<ul style="list-style-type: none"> <li>• Assess the value / benefit of implementing and maintaining sentinel flocks and devices.</li> </ul>	(9.2) PIRSA (13.3) AQIS	Project - Mar 2007	
6.7	Regional and Urban Planning	Mosquito-aware zoning of areas for development	Joint Lead	<ul style="list-style-type: none"> <li>• Collect data and map mosquito populations across the State to identify 'high risk areas'</li> <li>• DH to consider contracting a tertiary institution to map high risk areas.</li> </ul>	(Joint Lead: 3.8 LG & 8.3 Planning SA) Universities	Initiated by Dec 2006 then ongoing	
6.8	Regional and Urban Planning	Initiate project 'mosquito-aware' design and construction in mosquito-prone areas	Joint Lead	<ul style="list-style-type: none"> <li>• Develop guidelines / pamphlets / fact sheets</li> <li>• Research and review other State's guidelines with the view to develop guidelines / pamphlets</li> <li>• Draft documents to be put to Planning SA and Local Government for comment/amendment and ultimately ratification/application</li> </ul>	(Joint Lead: 3.7 LG & 8.3 Planning SA)	Feb 2007	
6.9	Management	Managing the human-mosquito interface, covering health & environmental interests	Joint Lead	<ul style="list-style-type: none"> <li>• Encourage open lines of communication between planners and EH Professionals, e.g. symposium, pamphlets, resources for EHOs and Planners on 'mosquito-aware planning'</li> <li>• Raise awareness throughout South Australian agencies by development of processes such as IMM for identified 'high-risk' residential development areas/proposals</li> </ul>	(Joint Lead: 3.7 LG) (8.4) Planning SA All agencies	Initially 2006 then ongoing	
6.10	Forward planning	Provide advice and risk /impact assessments	Advisory	<ul style="list-style-type: none"> <li>• Risk assessment of proposed developments such as new wetland areas and residential development adjacent existing wetland areas</li> <li>• Provide expert advice on potential health impacts of mosquitoes</li> <li>• Develop IMM resource package to provide models and information regarding mosquito management</li> </ul>		Ongoing  Feb 2006	

6.11	Forward planning	Review direction of DH service delivery on Crown and unincorporated lands	Lead	<ul style="list-style-type: none"> <li>• Prior identification of high risk mosquito areas</li> <li>• Carry out the review process.</li> </ul>		2006 project	
6.12	Forward planning	Incorporate mosquito related issues into tertiary curriculum for Town Planners & EHOs	Joint Lead	<ul style="list-style-type: none"> <li>• Consult with relevant professional bodies / Institutions</li> <li>• Provide suitable information to Universities to incorporate into curriculum</li> <li>• Review curriculum soon after implementation, and continue as necessary.</li> </ul>	<i>(Joint Lead: 16.3 Flinders, 18.5 Uni SA &amp; 19.2 Adelaide Uni)</i>	Implement project June 2006; target 2008 curriculum.	
6.13	Forward planning	Mosquito management contingency plans for flooding events, incursions & outbreaks	Joint Lead	<ul style="list-style-type: none"> <li>• Preparation of resource pool</li> <li>• Consult with SES and other relevant agencies</li> <li>• Establish and apply inter and intra agency communication protocol</li> <li>• Develop contingency plans</li> </ul>	<i>(Joint Lead: 7.6 NRMB &amp; 13.5 AQIS)</i>	Project - Mar 2007 for 2007/08 season	
6.14	Treatment	Development of a decision tree to guide when to implement control regimes	Lead	<ul style="list-style-type: none"> <li>• Develop and finalise treatment model</li> <li>• Incorporate into SAIMMS document and resource package.</li> </ul>	Consult with other Agencies	Feb 2006	
6.15	Treatment	Develop and implement appropriate pre and post treatment monitoring regimes	Joint Lead	<ul style="list-style-type: none"> <li>• Develop best practice strategy including factors such as predator species presence, flora and fauna type and abundance, mosquito species and abundance</li> <li>• Roll out in own DH treatment program</li> <li>• Include in resource package as best practice model.</li> <li>• Consider establishing site &amp; species specific thresholds (at which point chemical, etc. treatment will be considered)</li> <li>• Consider need for EIS (EPA) for current and proposed treatment regimes</li> <li>• Collate, analyse and record necessary data in order to determine suitability of regime.</li> </ul>	<i>(Joint Lead: All Agencies)</i>	Feb 2006  Ongoing	
6.16	Treatment	Manage mosquitoes, assess and select the most effective and environmentally sensitive control option(s) for lands under DH care and control	Lead	<ul style="list-style-type: none"> <li>• Consider environmentally appropriate landscape modification and biological control options</li> <li>• Selection of environmentally sensitive larvicides where their use is required</li> <li>• Use trained operators with up-to-date knowledge</li> </ul>		Ongoing	

				<ul style="list-style-type: none"> <li>Assess the effectiveness of the control program e.g. cost versus benefit</li> <li>Implement pre and post treatment monitoring regime</li> </ul>			
6.17	Treatment	Provide advice on appropriate larvicides and mosquito control options	Advisory	<ul style="list-style-type: none"> <li>Provide information to EHOs and any other relevant parties.</li> <li>Communicate and provide advice to Local Government.</li> </ul>		Feb 2006 Ongoing	
6.18	Treatment	Administer subsidy funding program for control activities by local councils	Lead	<ul style="list-style-type: none"> <li>Guidelines and pro forma provided annually to councils, DH provides subsidy funds for mosquito surveillance and control.</li> </ul>	Local Government	Annual	
6.19	Awareness	Improve EHOs' & Town Planners' awareness and knowledge in relation to mosquitoes	Lead	<ul style="list-style-type: none"> <li>Resource package for EHOs and Town Planners</li> <li>Regular updates on treatment &amp; control options to EHOs</li> <li>Gather feedback and review awareness campaigns as necessary.</li> </ul>	EHOs & Town Planners	April 2006 Ongoing	
6.20	Awareness	Health promotion activities to improve community awareness & understanding of mosquitoes and mosquito-borne diseases	Lead	<ul style="list-style-type: none"> <li>Educational / promotional programs e.g. 'Fight the Bite' program</li> <li>Increase awareness in GPs about BFV and RRV (CDCB), including the need to test for and report cases to CDCB</li> <li>Consider developing a primary school mosquito awareness program/pack</li> </ul>	Local Government Community GPs/Divisions of General Practice Education Dept. & Schools	Ongoing Seasonal April 2006  Project June 2007	
6.21	Research	Increased surveillance and monitoring to establish species / abundance data throughout SA	Initiator	<ul style="list-style-type: none"> <li>Promote and encourage Surveillance and monitoring activities by local councils through strategies such as SAIMMS and the subsidy funding grant program</li> <li>Identify gaps in surveillance and monitoring data throughout SA and approach local councils / contractors to consider an increase in activities in these areas.</li> </ul>	Other Agencies	Project - December 2006 then ongoing	
6.22	Research	Epidemiological study of mosquito-borne diseases in SA	Lead	<ul style="list-style-type: none"> <li>University of Adelaide currently undertaking study into relationship between climate variability, density of mosquito populations and the transmission of RRV in SA.</li> <li>Consult with Adelaide University to discuss possible research areas</li> </ul>	(19.4) Uni of Adelaide	Project 2006	

6.23	Research	Viral analysis/monitoring of reservoir species (vertebrates) and mosquito vectors	Joint Lead	<ul style="list-style-type: none"> <li>• DH to develop briefs in conjunction with PIRSA, DEH and universities for the following projects;</li> <li>• Vector competency studies</li> <li>• Investigate vertebrate host species of RRV and BFV</li> <li>• Increased and strategic viral analysis</li> <li>• Consider project briefs to include provision of a field officer as required</li> <li>• Implement projects as funds permit</li> </ul>	<i>(Joint Lead: 4.10 DEH) (9.6) PIRSA Uni's (16.7, 18.11, 19.5)</i>	Projects, then ongoing as needed.	
6.24	Licensing	Licensing and education of pest control companies and pest management technicians	Lead	<ul style="list-style-type: none"> <li>• Provision of licences (full and limited) to pest control operators</li> <li>• Provide advice and information in relation to applying for and holding a pest controllers licence, including licence conditions/limitations and education requirements and providers</li> </ul>		Ongoing	

## 7. Natural Resource Management Boards

### **NRMB Comment**

Natural Resource Management Boards (NRMB) combine the work of catchment boards, animal and plant control boards, and soil conservation boards. While the aim of this Strategy is to achieve integrated mosquito management, NRM Boards aim to deliver an integrated approach to the care and management of the local environment. A healthy ecosystem generally supports low numbers of mosquitoes and therefore reduces the potential for mosquitoes to impact on human health. There are eight NRM Boards in South Australia across varied geographic and ecological settings, with differing capacity in resources and requirements. Thus the level of relevance and the amount of effort to respond to the strategies will depend upon each NRM Boards individual circumstances and constraints, and fit within their strategic direction. The actions detailed below therefore provide an indication of the approach and types of activities that NRM Boards may undertake.

### **Roles and responsibilities in relation to mosquito management**

1. Manage water resources and catchment areas to ensure sustainable use
2. Develop and coordinate Natural Resource Management (NRM) Plans and activities
3. Assist with land management including soil conservation, revegetation and pest plant and animal control
4. Undertake mosquito surveys and / or reports, e.g. contracting Uni SA's Mosquito Research Lab to undertake studies in wetland areas
5. Educating landowners, e.g. in establishing / maintaining healthy wetlands that do not support high numbers of mosquitoes
6. Assist with flood control retention basins and detention basins

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
7.1	Prevention	Mosquito surveillance & monitoring activities	Participate	<ul style="list-style-type: none"> <li>• Undertake surveillance &amp; monitoring activities in new and existing wetland areas</li> <li>• Contribute to a pool of expertise and materials towards improved mosquito monitoring</li> </ul>	<i>(Lead: 3.3 LG, 6.3 DH)</i>	Ongoing	
7.2	Prevention	Promoting learning to live with mosquitoes through environmental management and minimising human interaction with mosquito populations	Joint Lead	<ul style="list-style-type: none"> <li>• Land management advice</li> <li>• Develop strategies to cope with impacts of flooding, e.g. flood plain mapping, coordinating flood mitigation works</li> <li>• Provide information and advice to landowners</li> </ul>	<i>(Joint Lead: 3.5 LG &amp; 6.4 DH)</i>	Ongoing	

				and the public on the role of mosquitoes in the environment and how to minimise adverse effects, e.g. elimination of breeding grounds, healthy wetland systems			
7.3	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Provide advice and share knowledge and data with other stakeholders</li> <li>• Contribute relevant data to central data storage (DH)</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH)</i> <i>All agencies</i>	Ongoing	
7.4	Management	Managing the human-mosquito interface, covering health & environmental interests	Advisory	<ul style="list-style-type: none"> <li>• Provide general comment to development plans when consulted</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	
7.5	Regional and Urban Planning	Provide advice and risk /impact assessments	Advisory	<ul style="list-style-type: none"> <li>• Monitoring and risk assessment of new &amp; existing wetland areas</li> <li>• Provide advice to local councils and landowners on the status of wetland areas including recommendations for future maintenance</li> </ul>	Local councils Land owners	Ongoing	
7.6	Forward Planning	Mosquito management contingency plans for flooding events, foreign incursions & outbreaks	Joint Lead	<ul style="list-style-type: none"> <li>• Preparation of resource pool</li> <li>• Consult with SES and other relevant agencies</li> <li>• Establish and apply an inter and intra agency communication protocol, e.g. determining the appropriate agencies/persons to inform/consult with</li> <li>• Notify DH/Mosquito Research Lab/Local Councils of planned flooding events in identified mosquito prone areas of the Adelaide, Mt Lofty Ranges, SAMDB, Eyre and Yorke Peninsula and Mid-North NRMB regions (subject to DH providing contact details).</li> </ul>	<i>(Joint Lead: 6.13 DH &amp; 13.5 AQIS)</i>	12.4	Forward Planning
7.7	Treatment	Implement pre and post treatment monitoring regime	Advisory	<ul style="list-style-type: none"> <li>• Determine factors such as predator species presence, vegetation type and abundance, mosquito species and abundance</li> </ul>	<i>(Joint Lead: All Agencies)</i>	Ongoing	

7.8	Treatment	Assess and select best and most environmentally sensitive control option(s)	Advisory	<ul style="list-style-type: none"> <li>• Consider environmentally appropriate landscape modification</li> <li>• Consider use of native fish as a control option</li> <li>• Selection of environmentally sensitive larvicides when chemical control is deemed necessary</li> <li>• Use trained operators with up-to-date knowledge</li> <li>• Assess the effectiveness of the control program e.g. cost versus benefit, environmental impact versus benefit</li> </ul>	EPA (Lead) DWLBC  PIRSA  Landowners	Ongoing	
7.9	Awareness	Provide advice and mosquito awareness to the community	Advisory	<ul style="list-style-type: none"> <li>• Community advice &amp; awareness of mosquito related risks (disease transmission) &amp; role in the environment</li> <li>• Educate landowners, e.g. in establishing / maintaining healthy wetlands that do not support high numbers of mosquitoes</li> <li>• Produce and distribute promotional/educational material</li> </ul>	Community	Ongoing	
7.10	Research	Increased surveillance and monitoring to establish species / abundance data throughout SA	Contributor	<ul style="list-style-type: none"> <li>• Mosquito surveys in wetland areas and detention basins</li> <li>• Contribute mosquito surveillance data to central data storage (DH)</li> </ul>	(6.21) DH Other Agencies	Ongoing	

## 8. Planning SA

### **Planning SA Comment:**

Planning SA, which is part of the Primary Industries and Resources, is responsible for guiding and administering the South Australian Planning and Development Assessment System. Planning SA is the State Government’s principal advisor on land-use planning, building, urban design and development strategies and policies. The agency’s role is to provide direction, advice, assistance, and information on a range of development proposals, opportunities and issues. Planning SA also administers the Development Act and related legislation, under which a number of committees are established to assist in the evaluation of development proposals, major projects and policy formulation.

### **Roles and responsibilities in relation to mosquito management**

1. Principal advisor on land use planning, building, urban design and development strategies and policies
2. Provide advice on development proposals, opportunities and related issues
3. Effective and efficient planning and development assessment policies and processes
4. Integrate consideration of mosquito related issues into land use planning and development processes within limitations of Planning SA’s mandate
5. Support awareness-raising of mosquito related issues and mitigation strategies within the limitations of Planning SA’s mandate

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
8.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Ongoing participation in SAIMMS group (to be convened at least biannually by DH)</li> </ul>	<i>(Lead: 6.5 DH) All agencies</i>	Ongoing	
8.2	Management	Minimise potential adverse impacts associated with the human-mosquito interface, in terms of health & environmental interests.	Joint Lead / Participate / support	<ul style="list-style-type: none"> <li>• Include reference to mosquito management in the Natural Resource Management Better Development plans Module.</li> <li>• Consider how mapping of high risk mosquito prone areas can be used to inform the development assessment process</li> <li>• Consider if DH should be identified as a referral agency for specific development applications in high risk mosquito prone areas (subject to DH mapping high risk mosquito prone areas)</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	

8.3	Regional and Urban Planning	Promote 'mosquito aware' design and construction in mosquito-prone areas	Joint Lead / Participate / promote	<ul style="list-style-type: none"> <li>Provide input to any 'mosquito-aware construction &amp; design' guidelines developed by DH.</li> </ul>	(Joint Lead: 3.7, 3.8 LG & 6.7, 6.8 DH) DPC ERD Court DTEI	Feb 2007	
8.4	Regional and Urban Planning	Encourage Local Government planners to consult with Environmental Health professionals	Promotion	<ul style="list-style-type: none"> <li>Assist the DH in encouraging local government planners to consult with Environmental Health professionals in regards to mosquito matters, e.g. via article inclusion in an electronic newsletter distributed to local Council planners</li> </ul>	(3.7) LG (6.9) DH PIA	Ongoing	
8.5	Awareness	Raising awareness of mosquito related issues and mitigation strategies	Advisory / promotion	<ul style="list-style-type: none"> <li>Promote mosquito-aware construction &amp; design guidelines by including on the Planning SA website.</li> <li>Consider promotion of mosquito-aware construction &amp; design guidelines to the established Development Act committees</li> </ul>		Ongoing	

## 9. Primary Industries and Resources SA

### **PIRSA Comment**

Primary Industries and Resources South Australia is the primary pesticide use regulator for SA, and provides advice and management to the fisheries industry. The role of PIRSA in mosquito management is not direct; however, many of PIRSA's key objectives are indirectly related to mosquito management, and highlight the importance of interagency integration.

### **Roles and responsibilities in relation to mosquito management**

1. Primary pesticide use regulator for SA
2. Biosecurity and standards for rural chemicals including appropriate use of pesticides, e.g. spray drift
3. Agrivet Chemical Information Service for all registered agricultural and veterinary chemicals in Australia which may define the site-specific use of pesticides
4. Provide advice and management for the fisheries industry including provisions for marine parks, aquatic reserves and protected species
5. Assistance and advisory role specific to the use of native fish as mosquito predators, e.g. appropriate species, mechanisms to move fish stocks
6. RRV monitoring through sentinel horse populations (currently located at Bolivar, Angaston and Waikerie)

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
9.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Share mosquito related data.</li> <li>• Consider capacity to collect and maintain pesticide use data.</li> <li>• Allow access by the public / and or other agencies to these data sets.</li> <li>• Share sentinel flock data (Animal Health div).</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH) All agencies</i>	Ongoing	
9.2	Prevention	Monitor sentinel flocks/herds to act as an early warning system for arbovirus activity	Lead	<ul style="list-style-type: none"> <li>• Continue current sentinel horse flock program.</li> <li>• Consider additional monitoring of sentinel flocks (DH to clarify position).</li> <li>• Develop inter-agency protocols and data sharing arrangements.</li> </ul>	<i>DH (6.6) AQIS (13.3)</i>	Ongoing	Current budget

9.3	Management	Managing the human-mosquito interface, covering health & environmental interests	Joint Lead	<ul style="list-style-type: none"> <li>• Encourage open lines of communication with other agencies and the public in relation to mosquitoes using established communication pathways.</li> <li>• Encourage fisheries, planning policy group and Office of Local Government to consider mosquito-related issues through increased communication and planning.</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	
9.4	Treatment / Awareness	Provide advice on pesticide use and control techniques	Advisory	<ul style="list-style-type: none"> <li>• Native fish as mosquito predator</li> <li>• Appropriate use of pesticides</li> <li>• Advice to fisheries and the public on use conditions.</li> <li>• Communication with APVMA on pesticide use.</li> <li>• Investigate spray drift incidences.</li> </ul>	<i>(PIRSA is not the primary source of advice) EPA</i>	Ongoing	
9.5	Research	Study into chemical / physical / biological control methods & outcomes	(Joint) Lead	<ul style="list-style-type: none"> <li>• Study of adverse effects</li> <li>• Study of effectiveness of current and potential control methods</li> <li>• Study of off target impacts</li> <li>• Current use information / data display and research</li> </ul>	<i>Refer 5.5 EPA</i>	Ongoing / as required	Grant application required for SARDI
9.6	Research	Viral analysis/monitoring of reservoir species and mosquito vectors	Contributor / Service provider	<ul style="list-style-type: none"> <li>• Contribute to viral analysis / monitoring by increasing monitoring of sentinel flocks.</li> <li>• Consider implementing other sentinel flock / reservoir species viral analysis (DH to confirm position)</li> <li>• Vector competency studies</li> <li>• Investigate vertebrate host spp of RRV and BFV</li> <li>• Consult with other agencies to discuss research opportunities.</li> </ul>	<i>(Joint Lead: 4.10 DEH &amp; 6.23 DH)  Uni's (16.7, 18.11, 19.5)</i>	Ongoing / as required	SARDI and Animal Health would require grant funding.

## 10. SA Water

### SA Water Comment

As the name suggests the core business of SA Water is the provision of water services. Mosquito larvae have an aquatic life cycle, therefore the availability and quality of water impacts greatly on mosquito abundance.

### Roles and responsibilities in relation to mosquito management

1. Provide water and wastewater services to SA
2. Assist in the expansion and development of the SA water industry
3. Provide technical advice and support in the areas such as:-
  - Water utility operations
  - Water resource management
  - Engineering services
  - Research and laboratory services, including the Australian Water Quality Centre (AWQC)
4. Ensure that SA Water facilities are not breeding grounds for levels of mosquito populations that are likely to create a nuisance or risk to health

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
10.1	Prevention / Research	Mosquito surveillance & monitoring activities	Lead (for own property) / Participate	<ul style="list-style-type: none"> <li>• Surveillance &amp; monitoring activities on land owned by SA Water as required to assess if water reservoirs provide mosquito-breeding habitat and contribute to increased mosquito presence in adjacent areas</li> <li>• Maintain a capability to field staff in surveillance and monitoring practices</li> </ul>	(Lead: 3.3 LG, 6.3 DH)	Ongoing	
10.2	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Advise &amp; share knowledge with stakeholders</li> <li>• Contribute data/information to central data storage (DH)</li> <li>• Participate in key stakeholder reference group</li> </ul>	(Lead: 6.5 DH) All agencies	Ongoing	

10.3	Management	Managing the human-mosquito interface, covering health & environmental interests	Joint Lead	<ul style="list-style-type: none"> <li>• Add mosquito risk assessment into Environmental Impact Statement and Environmental Management System processes</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	
10.4	Treatment	Implement pre and post treatment monitoring regime.	Lead (for own property)	<ul style="list-style-type: none"> <li>• Determine factors such as predator species presence, vegetation type and abundance, mosquito species and abundance as required</li> </ul>	<i>(Joint Lead: All Agencies)</i>	Ongoing	
10.5	Treatment	Assess and select best and most environmentally sensitive control option(s)	Lead (for own property)	<ul style="list-style-type: none"> <li>• Consider environmentally appropriate landscape modification or biological control</li> <li>• Consider the effect of larvicides on non-target organisms</li> <li>• Use trained operators with up-to-date knowledge</li> <li>• Assess the effectiveness of the control program</li> <li>• Amend revegetation guidelines to include mosquito control options or develop guideline on pest insect management</li> </ul>		Ongoing	
10.6	Research	Increased surveillance and monitoring to establish species / abundance data throughout SA	Contributor	<ul style="list-style-type: none"> <li>• Provide reports of mosquito populations to DH when requested</li> </ul>	(6.21) DH Other Agencies	Ongoing	

## 11. State Emergency Service

### **SES Comment**

The State Emergency Service has the primary responsibility for storm and flood mitigation under the State Emergency Service Act. Response to such incidences can include the need to facilitate mosquito surveillance and control, and also the development of inter-agency contingency plans.

### **Roles and responsibilities**

*Detailed below are the **general** roles & responsibilities of the SES – in certain instances those roles & responsibilities will impact mosquito management*

1. Offer immediate assistance during emergencies and disasters
2. Provide community response to extraordinary events such as flood and storm damage on a daily basis.
3. Liaise with other emergency services and government agencies to provide the best response to a situation
4. Research, develop and implement preventative strategies to assist the public prepare for and reduce the impact of natural hazards such as flooding and severe weather

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
11.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Provide advice on flooding events and share knowledge and data with other stakeholders</li> <li>• Contribute relevant data to central data storage (DH)</li> <li>• Encourage open lines of communication between agencies.</li> </ul>	<i>(Lead: 6.5 DH) All agencies</i>	Ongoing	
11.2	Forward Planning	Provide response to extraordinary events	Lead	<ul style="list-style-type: none"> <li>• Participate in the development of mosquito contingency plans</li> <li>• Consider mosquito management contingency plans when attending flooding events</li> </ul>			

## 12. Department of Water, Land and Biodiversity Conservation

### *DWLBC Comment*

Mosquito-related issues are not a core consideration for the Department of Water, Land and Biodiversity Conservation (DWLBC). Certain activities and functions engaged by DWLBC may, however, inadvertently impact on the presence and abundance of mosquito populations. Restoration and management of the State's natural resources to ensure healthy, functioning ecosystems will promote balanced mosquito and predator populations, which in turn reduces the likelihood that mosquito populations will impact on human health.

### *Roles and responsibilities in relation to mosquito management*

1. Integrated management of the State's natural resources
2. Improved health and productivity of biodiversity, water, land and marine resources
3. Land management, e.g. remnant native vegetation (of park/private land), revegetation, pest plants and animals, soil conservation
4. Management of catchments and water quality
5. Flood mitigation strategies
6. Comment and licence water affecting activities, i.e./dams, culverts, and have guidelines to manage watercourses – e.g. avoid pooling of water.

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
12.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Provide advice and share knowledge with other stakeholders</li> <li>• Contribute data/information to central data storage (DH), subject to intellectual property rights</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH)</i> <i>All agencies</i> Other agencies have an interest including Murray-Darling Basin Commission Conservation Council	Ongoing	
12.2	Management	Managing the human-mosquito interface, covering health & environmental interests	Contributor	<ul style="list-style-type: none"> <li>• Consider mosquito-related issues in areas linked to the planning and development process, e.g. water and land management activities including flooding</li> <li>• Share knowledge &amp; information relating to impacts of mosquitoes to inform planning &amp; development decisions</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	

				<ul style="list-style-type: none"> <li>• Discourage development of residential areas in close proximity to wetland areas to reduce human impacts on the environment (which in turn aids in managing the human-mosquito interface)</li> </ul>			
12.3	Regional and Urban Planning	Risk Assessments of new and existing wetland areas, both natural and man-made	Joint Lead	<ul style="list-style-type: none"> <li>• Seek advice from appropriate agencies to undertake risk assessments</li> <li>• Guidelines to manage watercourses including water-affecting activities and swamp management</li> <li>• Provide input/advice to DH regarding wetland status, e.g. overall 'health' of the system</li> </ul>	<i>(Joint Lead: 3.9 LG &amp; 4.4 DEH)</i>	Project 2006 then ongoing	
12.4	Forward Planning	Planning for events such as:- Raising & lowering of water levels in the River Murray	Contributor	<ul style="list-style-type: none"> <li>• Provide comment/information when requested about the likely impact of these events on mosquito populations</li> <li>• Communicate with NRMB when flooding events are planned along the River Murray</li> <li>• In the event of a perceived risk to human health as a result of mosquito activity, liaise with NRMB, local Councils and the Department of Health</li> </ul>	Other agencies have an interest		
12.5	Treatment	Assess and select best and most environmentally sensitive control option(s)	Advisory	<ul style="list-style-type: none"> <li>• Consider environmentally appropriate landscape modification to encourage natural processes</li> <li>• Recommend stream management activity that supports the process of free flowing streams which will reduce the potential for mosquito breeding activity</li> </ul>	Other agencies have an interest	Ongoing	
12.6	Awareness	Provide advice on the role of mosquitoes in the environment	Joint Lead	<ul style="list-style-type: none"> <li>• Provide technical advice to other agencies and the public on water dependant ecosystem condition and health</li> </ul>	Other agencies have an interest	Ongoing	

## 13. Australian Quarantine and Inspection Service

### *AQIS Comment*

The Australian Quarantine and Inspection Service (AQIS) is part of the Australian Government Department of Agriculture, Fisheries and Forestry. AQIS undertake quarantine inspection for international passengers and cargo, mail, plants and animals or plant products arriving in Australia. Many plants and animals must be isolated so any pest or disease risks can be identified and prevented from entering the community. As part of their role, AQIS undertake mosquito surveillance and monitoring to detect foreign mosquito incursions at first ports.

### *Roles and responsibilities in relation to mosquito management*

1. Undertake inspection and supervision of treatment of imported cargo / vessels and aircraft with potential to introduce exotic mosquitoes
2. Conduct surveillance and monitoring of international seaports and airports to detect exotic mosquitoes and ensure local target species are not in numbers that could compromise exports of agricultural product
3. Ensure assessment of passengers and crew arriving on international vessels and aircraft are checked for human health risk such as yellow fever and ensure appropriate medical controls are instigated where appropriate
4. Undertake surveillance of international seaports and airports to ensure operators undertake remediation of potential mosquito breeding sites

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
13.1	Prevention	Management and preventative action of first ports – land and sea	Lead	<ul style="list-style-type: none"> <li>• Inspection &amp; supervision of treatment of imported cargo, vessels &amp; aircraft</li> <li>• Mosquito surveillance and monitoring of areas including wetlands</li> <li>• Contribute to a pool of expertise and materials towards improved mosquito monitoring</li> <li>• Assessment of passengers &amp; crew arriving on international vessels/aircraft</li> <li>• Ensuring port operators undertake remediation of potential mosquito breeding sites</li> </ul>	Port authorities Port owners Airport Operators RAAF bases	Ongoing	

13.2	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>Copies of AQIS records can be provided to other agencies and interested parties. These records include surveillance and identification results from sentinel tyre traps, dipping sites and CO<sub>2</sub> traps.</li> <li>Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH)</i> <i>All agencies</i>	Ongoing	
13.3	Prevention	Consider using sentinel devices to act as an early warning system for arbovirus activity	Lead	<ul style="list-style-type: none"> <li>Sentinel tyre traps are used in all international seaports and airports (including RAAF bases) as a means of detection of exotic mosquitoes that may have become established.</li> <li>Routinely monitored by AQIS.</li> </ul>	(9.2) PIRSA (6.6) DH	As required	
13.4	Management	Managing the human-mosquito interface, covering health & environmental interests	Joint Lead	<ul style="list-style-type: none"> <li>Surveillance of seaports and airports by AQIS includes investigating possible breeding sites and ordering remediation by the responsible party.</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	
13.5	Regional and Urban Planning	Mosquito management contingency plans for flooding events, foreign incursions & outbreaks	Joint Lead	<ul style="list-style-type: none"> <li>Preparation of resource pool</li> <li>Consult with SES and other relevant agencies</li> <li>Consult on MOUs with port operators</li> <li>Consult agencies responsible for incursions</li> </ul>	<i>(Joint Lead: 6.13 DH &amp; 7.6 NRMB)</i> PIRSA		
13.6	Treatment	Implement pre and post treatment monitoring regime	Lead (for own property)	<ul style="list-style-type: none"> <li>Determine factors such as predator species presence, vegetation type and abundance, mosquito species and abundance</li> <li>Report local target species to relevant authorities if detected in large numbers</li> </ul>	<i>(Joint Lead: All Agencies)</i>	Ongoing	
13.7	Treatment	Assess and select best and most environmentally sensitive control option(s)	Lead (for own property)	<ul style="list-style-type: none"> <li>Consider environmentally appropriate landscape modification</li> <li>Selection of environmentally sensitive larvicides</li> <li>Use trained operators with up-to-date knowledge</li> <li>Assess the effectiveness of the control program e.g. cost versus benefit</li> </ul>		Ongoing	
13.8	Research	Increased surveillance and monitoring to establish species / abundance data throughout SA	Contributor	<ul style="list-style-type: none"> <li>Records of species detected in locations AQIS performs trapping can assist in research as appropriate.</li> </ul>	(6.21) DH Other Agencies	Ongoing	

## 14. Commonwealth Department of Health & Ageing/Australian Health Protection Committee/Communicable Disease Network Australia & Australian Pesticides & Veterinary Medicines Authority (APVMA)

### ***About the Commonwealth Department of Health and Ageing - Australian Health Protection Committee***

The Australian Health Protection Committee (AHPC) provides policy and operational leadership in the national management of public health emergencies and national strategic direction, coordination and advice on issues associated with communicable disease (excluding chronic disease) threats and environmental threats to human health. The Communicable Diseases Network Australia (CDNA) is a subcommittee of the AHPC. The CDNA assists with maintaining the National Notifiable Diseases Surveillance System (NNDSS). The National Arbovirus and Malaria Advisory Committee (NAMAC) was formed in February 2001 as a technical advisory group and reports to the CDNA.

### ***About the Australian Pesticides and Veterinary Medicines Authority***

The Australian Pesticides and Veterinary Medicines Authority (APVMA) is an Australian government authority responsible for the assessment and registration of pesticides and veterinary medicines and for their regulation up to and including the point of retail sale.

### ***Roles and responsibilities in relation to mosquito management***

**The National Arbovirus and Malaria Advisory Committee (NAMAC) is a working group of the Communicable Diseases Network Australia (CDNA) which:**

1. Makes recommendations on arbovirus and malaria surveillance, strategic arbovirus and malaria disease management and vector control
2. Provides expert technical advice on arboviruses and malaria to the CDNA
3. Assists in the detection, management and control of real or potential outbreaks of arboviral and malarial disease

**The APVMA:**

1. Administers the National Registration Scheme for Agricultural and Veterinary Chemicals (NRS) (in partnership with the States and Territories and with the active involvement of other Australian government agencies)
2. Independently evaluates the safety and performance of chemical products intended for sale (e.g. insect repellents, larvicides), to help ensure that the health and safety of people, animals and the environment are protected. Only products that meet the APVMA's standards for safety and performance are registered and therefore legally allowed to be supplied & used (according to registered label directions/precautions). APVMA also does not register products if their use is likely to jeopardise Australian trade or industry, or if they are ineffective against the target organism.

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
14.1	Prevention	Mosquito surveillance & monitoring activities	Contribute	<ul style="list-style-type: none"> <li>Surveillance &amp; monitoring activities: human cases of arbovirus infection are monitored through the National Notifiable Diseases Surveillance System (NNDSS). States &amp; Territories each maintain separate jurisdictional surveillance, but they all report their results, using common case definitions, to the CDNA</li> </ul>	<i>(Lead: 3.3 LG, 6.3 DH)</i> AQIS State Government agencies (DH, PIRSA) & Local Government	Ongoing	
14.2	Communication	Sharing of data & knowledge across agencies & interagency collaboration	Provider	<ul style="list-style-type: none"> <li>Provide expert technical advice via the CDNA on arboviruses &amp; malaria &amp; assist in the detection, management &amp; control of real or potential outbreaks of arboviral and malarial disease in Australia (NAMAC)</li> <li>Maintain NAMAC website which provides a national overview of human arbovirus &amp; malaria surveillance; mosquito surveillance; &amp; virus surveillance</li> </ul>	<i>(Lead: 6.5 DH)</i> All agencies	Ongoing	
14.3	Management	Managing the human-mosquito interface, covering health interests	Joint Lead	<ul style="list-style-type: none"> <li>Response plans for arboviruses: NAMAC has initiated strategic universal approaches for arbovirus disease management &amp; control through the development of national arbovirus response plans. National arbovirus response plans for JEV, MVEV, WNV &amp; Dengue are currently being drafted.</li> <li>Exotic vector surveillance &amp; control: responsibilities for exotic vector surveillance &amp; control at Australian borders will be incorporated into an MOU between AQIS &amp; DOHA.</li> </ul>	<i>(Joint Lead: All agencies)</i> AQIS State Government agencies (DH, PIRSA) & Local Government	Ongoing	
14.4	Research		Lead	<ul style="list-style-type: none"> <li>Studies into repellents &amp; their efficacy (APVMA)</li> <li>maintain/update laboratory arbovirus case definitions (NAMAC)</li> <li>investigate &amp; report on arboviral disease risk for Australia (including incursions of exotic vectors) and recommend mitigation strategies e.g. to date: MVEV, JEV (NAMAC)</li> </ul>	AQIS State Government agencies (DH, PIRSA) & Local Government	Ongoing / as required	

## 15. Australian Institute of Environmental Health (AIEH)

### ***AIEH Comment***

The SA Branch of the AIEH has formed several Special Interest Groups (SIGs) with the intention of improving member knowledge and awareness and the provision of services related to environmental health. These SIGs provide a forum in which mosquito-related issues can be discussed and information disseminated to Environmental Health Practitioners and other relevant bodies. The AIEH is therefore recognised as an important player in increasing awareness of the impacts of mosquitoes.

### ***Roles and responsibilities***

*Detailed below are the **general** roles & responsibilities of the AIEH – some of those roles & responsibilities relate to mosquito management*

1. Advocate for appropriate standards in environmental health
2. Represent the professional interests of Environmental Health Practitioners
3. Enhancement of environmental health standards and associated service to the community through advocacy, promotion, education and leadership
4. Formation of Special Interest Groups (SIG) to further knowledge and progress in specific areas, e.g. Disease Control SIG helps keep members informed about developments in mosquito-borne disease, health promotion activities, etc.
5. Educate and disseminate information to Environmental Health Practitioners

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
15.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Provide advice and share knowledge with other stakeholders</li> <li>• Contribute data/information to central data storage (DH)</li> <li>• Direct liaison with DH</li> <li>• Disease Control Special Interest Group</li> <li>• Local area Council networks</li> <li>• Formal local mosquito control committees which include all affected agencies</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH)</i> <i>All agencies</i>	Ongoing	
15.2	Awareness	Increase members awareness and knowledge in relation to mosquitoes	Lead	<ul style="list-style-type: none"> <li>• Regular meetings of the Disease Control SIG</li> <li>• Incorporate mosquito-related issues into meeting agendas for discussion as required</li> <li>• Consider the need for mosquito related training and education</li> <li>• Consider promotional/educational activities on a needs basis</li> </ul>	EHOs	Ongoing	

## 16. Flinders University

### *Flinders Uni Comment*

As a tertiary institution, Flinders University has the capability to undertake a variety of research tasks to provide increased knowledge and awareness of mosquito-related issues. These areas of study may be directly or indirectly linked to mosquito presence and activity. Flinders University is also home to the Department of Environmental Health and therefore has the potential to increase awareness of mosquito-related issues in Environmental Health Practitioners prior to employment in the field.

### *Roles and responsibilities in relation to mosquito management*

1. Research and study various mosquito-related issues, e.g. relationship between climate variability, density of mosquito populations and RRV transmission
2. Research and study areas which may impact on mosquito activity, e.g. water resource management, wetland ecology
3. Provide advice and knowledge to other stakeholders
4. Department of Environmental Health which provides teaching, research and consultancies and offers the Bachelor of Environmental Health program

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
16.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Provide advice and share knowledge with other stakeholders</li> <li>• Contribute data/information to central data storage (DH), subject to intellectual property rights</li> <li>• Contribute information/data sets specific to water resource management and wetland ecology, subject to intellectual property rights</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH) All agencies</i>	Ongoing	
16.2	Management	Managing the human-mosquito interface, covering health & environmental interests	Joint Lead	<ul style="list-style-type: none"> <li>• Consider mosquito-related issues in areas linked to the planning and development process, e.g. wetland surveying and research</li> <li>• Share knowledge and information in relation to impacts of mosquitoes to inform planning and development decisions</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	

16.3	Planning / Awareness	Incorporate mosquito related issues into tertiary curriculum for EHOs	Joint Lead	<ul style="list-style-type: none"> <li>Consult with relevant professional bodies / Institutions</li> <li>Utilise DH resource pack/liaise with DH to determine appropriate additions for curriculum</li> <li>Review appropriateness of curriculum after initial implementation then as required</li> </ul>	<i>(Joint Lead: 6.12 DH, 18.5 Uni SA &amp; 19.2 Adelaide Uni)</i> Students	June 2006	
16.4	Research	Increased surveillance and monitoring to establish species / abundance data throughout SA	Contributor	<ul style="list-style-type: none"> <li>Consider and encourage surveillance and monitoring activities through related research, e.g. honours, PhD</li> </ul>	(6.21) DH Other Agencies	Ongoing	Subject to funding provider
16.5	Research	GIS database development	Contributor	<ul style="list-style-type: none"> <li>Provide a consultancy service to develop a GIS mosquito database</li> <li>Arbovirus mapping</li> <li>GIS spatial analysis and modelling</li> </ul>	(6.7) DH DEH DWLBC	As required	Subject to funding provider
16.6	Research	Arbovirus reservoir and vector species/vector competence studies	Research Project	<ul style="list-style-type: none"> <li>Consult and work in conjunction with DH/other agencies when approached for research</li> </ul>	Other Agencies	When approached	Subject to funding provider
16.7	Research	Viral analysis/monitoring of vertebrate reservoir species and mosquito vectors	Research Project	<ul style="list-style-type: none"> <li>Consult and work in conjunction with DH/other agencies when approached for research</li> <li>GIS mapping and disease vector modelling</li> </ul>	<i>(Joint Lead: 4.10 DEH &amp; 6.23 DH)</i> <i>(9.6) PIRSA</i> <i>Uni's (18.11 &amp; 19.5)</i>	When approached	Subject to funding provider
16.8	Research	Relationship between climate variability, density of mosquito populations and RRV transmission	Research Project	<ul style="list-style-type: none"> <li>Consult and work in conjunction with DH/ other agencies when approached for research</li> <li>Modelling the effects of climate change on mosquito populations and disease transmission</li> </ul>	Other agencies	When approached	Subject to funding provider
16.9	Research	Development of arbovirus risk analysis and notification spatial application	Research Project	<ul style="list-style-type: none"> <li>Liaise with other agencies as necessary to determine the capabilities of the program</li> <li>Consult and work in conjunction with other agencies to develop disease risk and notification protocols in a spatial application</li> </ul>	Other agencies	When approached	Subject to funding provider

**NOTE: FLINDERS UNI WILL MATCH \$ FOR \$ ANY CONTRIBUTION FROM ANY OUTSIDE AGENCY FOR POST DOC. RESEARCH**

## 17. SA Tourism Commission

### **SATC Comment**

The South Australian Tourism Commission is a small agency with a targeted focus and budget on the sustainable development of tourism in SA. The SATC directs resources to its core activity area which is promoting tourism. The SATC is also committed to informing tourists about the potential health risks associated with travel to particular areas, while ameliorating factors that could be seen as dissuasive to visitation. It is therefore seen as strategically important that awareness programs and related communications place SA mosquito related programs in a national and international context while recognising the value of preventative measures.

### **Roles and responsibilities**

*Detailed below are the **general** roles & responsibilities of the SATC – some of those roles & responsibilities relate to mosquito management*

1. Provide advice and information on tourism within SA including

- Tourist attractions

- Specific interest regions

- Accommodation, transport and tours

- Travellers' tips

- Brochures and maps

2. Disseminating educational / promotional material to tourists, e.g. Fight the Bite which advised of areas where RRV is more prevalent and personal / household protection measures against mosquito-borne disease

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
17.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Use current agency contacts (through DH resource )</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH)</i> <i>All agencies</i>	Ongoing	17.1
17.2	Management	Managing the human-mosquito interface, covering health & environmental interests	Participate	<ul style="list-style-type: none"> <li>• Support integration of protective measures into tourism development guidelines</li> <li>• Encourage compliance of Australian Major Events (AME) with relevant protocols</li> </ul>	<i>(Joint Lead: All agencies)</i> AME	Ongoing	17.2
17.3	Awareness	Health promotion activities to improve tourists & operators awareness & understanding of mosquitoes	Participate	<ul style="list-style-type: none"> <li>• Facilitate implementation of programs for tourist awareness of mosquito related risks (disease transmission) &amp; role in the environment</li> <li>• Advocate for inclusion of mosquito awareness as part of tourism accreditation programs.</li> <li>• Facilitate distribution of 'Fight the Bite' program resources to operators</li> <li>• Facilitate training program for Visitor Information Centre staff in higher risk areas</li> </ul>	Tourists National Tourism Accreditation Program, Eco Certification Program, tourism operators Tourism operators Visitor Information Centres	Ongoing	17.3

## 18. University of SA

### Uni SA Comment

The University of South Australia is committed to educating professionals, creating and applying knowledge, and serving the community. The Uni of SA has reputation as a national leader in collaborative research, has been recognised nationally for innovation in teaching. These areas of study may be directly or indirectly related to mosquito presence and activity. The University also supports the Mosquito Research Laboratory which is contracted to undertake seasonal mosquito monitoring, research and control, and also undertakes industry and independent research. The mosquito research lab has the capability to increase knowledge and awareness of mosquito related issues.

### Roles and responsibilities in relation to mosquito management

1. Research and study various mosquito-related issues, e.g. effectiveness of control methods
2. Provide a service to local councils for mosquito surveillance and control activities
3. Provide advice and knowledge to other stakeholders
4. Provide mosquito related training to local councils, e.g. Environmental Health and Plant and Animal Control employees

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
18.1	Prevention/ Research	Assist development of predictive models of when mosquito populations are likely to increase and lead to increase in disease	Assist / service provider	Data collection & transfer of data to DH (Subject to IP considerations). Honours/PhD students linked to the Mosquito Research laboratory could conduct specific modelling related projects. For example: (1) Coastal modelling and point specific control. (2) Assist in developing models <ul style="list-style-type: none"> <li>• Use of established life-table models for container-breeders (CimSim).</li> <li>• Use of CSIRO platforms for other species, continued climate-response modelling</li> </ul>	(Lead: 6.1 DH)	Ongoing	Honours & PhD students funded through one off grants. Health and Uni co-operate in applying for federal grants (e.g. NHMRC)

18.2	Prevention	Mosquito surveillance & monitoring activities	Service Provider	<ul style="list-style-type: none"> <li>• Surveillance &amp; monitoring activities</li> <li>• Event-based monitoring e.g. after summer storms</li> <li>• Contribute to a pool of expertise and materials towards improved mosquito monitoring</li> <li>• Provide mosquito related training to local Councils</li> <li>• Liaise with local residence, councils and state government departments</li> </ul>	<i>(Lead: 3.3 LG, 6.3 DH)</i>	Ongoing	Fee for service
18.3	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>• Provide advice and share knowledge with other stakeholders</li> <li>• Electronic newsletters, web-based information sharing</li> <li>• Participate in key stakeholder reference group</li> </ul>	<i>(Lead: 6.5 DH) All agencies</i>	Ongoing	
18.4	Management	Managing the human-mosquito interactions , covering health & environmental interests	Joint Lead	<ul style="list-style-type: none"> <li>• Provide advice in town planning in the form of consultancy and do EIS and other types of contract work.</li> <li>• Awareness program for people who may inadvertently deal with mosquito issues e.g. tank cleaners, builders, garden centre staff, pool and garden pond suppliers. This could be in the form of a mail out information package to the service provider to increase their awareness and therefore pass it on to their clients.</li> </ul>	<i>(Joint Lead: All agencies)</i>	Ongoing	
18.5	Planning / Awareness	Incorporate mosquito related issues into tertiary curriculum for Town Planners	Joint Lead	<ul style="list-style-type: none"> <li>• Consult with relevant professional bodies / Institutions (Refer to DH information pack)</li> </ul>	<i>(Joint Lead: 6.12 DH, 16.3 Flinders &amp; 19.2 Adelaide Uni)</i>		

18.6	Treatment	Implement pre and post treatment monitoring regime	Service Provider	<ul style="list-style-type: none"> <li>• Apply Treatment as a service to clients</li> <li>• Assess sensitive areas that may have restrictions to type/frequency of control activity</li> <li>• Determine factors such as predator species presence, vegetation type and abundance, mosquito species and abundance</li> <li>• Consider establishing site &amp; species specific thresholds</li> <li>• Consider need for EIS (EPA)</li> <li>• Mapping of larvae sites including highlighting environmentally sensitive areas in which treatment may be restricted (with EPA)</li> </ul>	<i>(Joint Lead: All Agencies)</i>	Ongoing	Fee for service
18.7	Treatment	Assess and select best and most environmentally sensitive control option(s)	Service Provider	<ul style="list-style-type: none"> <li>• Consider environmentally appropriate landscape modification</li> <li>• Selection of environmentally sensitive larvicides</li> <li>• Use trained operators with up-to-date knowledge</li> <li>• Assess effectiveness of control program e.g. cost versus benefit</li> <li>• Implement a training program on mosquito biology and ecology to pest controllers to increase understanding of the issues around control of mosquitoes</li> <li>• Develop an IPM approach to mosquito management through monitoring and establishing thresholds</li> <li>• Research and refine prudent use of insecticides in the form of treated barriers and 'lure and kill' technologies to avoid use of broad acre treatment of mosquitoes.</li> </ul>		Ongoing	Fee for service Apply for competitive grants (DH could investigate any possible grants or state / federal funding options. This pool of options could be accessed by local councils for capital works)

18.8	Awareness	Health promotion activities to improve awareness & understanding of mosquitoes	Contributor	<ul style="list-style-type: none"> <li>• Increased awareness of mosquito related risks (disease transmission) &amp; role in the environment</li> <li>• Develop School teaching Kits.</li> <li>• Courses for Teachers</li> <li>• Media involvement e.g. news stories and talkback radio</li> <li>• Rural Field day displays, posters, Microscope Computer PPT.</li> <li>• Introduce a refresher course for doctors and other health agencies</li> <li>• Support to present at conferences that are not specifically mosquito related e.g. Zoology society to demonstrate their role in the ecosystem and benefits of studying mosquitoes</li> <li>• Publicly listed phone number for general public queries</li> </ul>	(6.20) DH Local Government	Ongoing	
18.9	Research	Increased surveillance and monitoring to establish species / abundance data throughout SA	Contributor	<ul style="list-style-type: none"> <li>• Variety of options, Full service for local councils, to counting and id.</li> <li>• Possible co-operative research projects Hons, PhD e.g. Effects of artificial inundation of Riverine flood plains</li> </ul>	(6.21) DH Other Agencies	Ongoing	Fee for service
18.10	Research	Arbovirus reservoir and vector species/vector competence studies	Research Project	<ul style="list-style-type: none"> <li>• Providing supervision for PhD, Honours &amp; Masters students to conduct specific research.</li> <li>• Postgraduate Research projects</li> </ul>	Other Agencies	Ongoing	Subject to funding provider
18.11	Research	Viral analysis/monitoring of reservoir species and mosquito vectors	Research Project	<p>Have a pool of cash to draw on specifically for;</p> <p>(1) Viral analysis of Mosquitoes captured during project work.</p> <p>(2) Viral analysis of reservoir species in Riverland and paying staff to obtain blood. Staff that live in the area which could access blood via various means (macropod culling programs, trapping of</p>	<i>(Joint Lead: 4.10 DEH &amp; 6.23 DH)</i> <i>(9.6) PIRSA</i> <i>Uni's (16.7 &amp; 19.5)</i>	Ongoing	Subject to funding provider

				<p><i>Hydromys</i>, Destruction of introduced pest animals, e.g. pigs, national parks etc</p> <ul style="list-style-type: none"> <li>• Specific surveys of areas not normally monitored via research project, or post grad student.</li> <li>• Specifically funded targeted trips to remote/ hard to access areas to conduct intensive surveys in areas not normally surveyed</li> </ul>			
18.12	Research	Development of a common data storage system across all agencies that monitor mosquitoes	Research Project/ Contributor (Joint Leader)	<ul style="list-style-type: none"> <li>• Implementation of a common format for all mosquito related data and meta data collected as part of mosquito monitoring projects. This would enable all agencies to be consistent in recording capture data and the prevailing conditions that were present at the time of capture</li> <li>• Mapping of larvae sites in significant flood prone areas, including GPS, Photos, and possibly control points, e.g. Areas around Renmark when locks are raised for artificial flooding</li> </ul>	<p>(6.5) DH All Agencies</p> <p>(6.1 &amp; 6.13) DH</p>	Initial effort then Ongoing management of systems	Minor grant to establish then agency managed

## 19. Adelaide University

### **Adelaide Uni Comment**

Adelaide University has a rich tradition in education and research. Adelaide has major strengths in health sciences, biological sciences, and environmental sciences, and is a major contributor to research in South Australia. The University of Adelaide has the capability to undertake a variety of research projects to contribute to increased knowledge of mosquitoes throughout SA, and to increase knowledge and awareness of mosquito related issues in general.

### **Roles and responsibilities in relation to mosquito management**

1. Department of Public Health Epidemiological study on the relationship between climate variability, density of mosquito populations and the transmission of RRV in SA
2. Research and study into areas which may impact on mosquito activity, e.g. Climate change
3. Provides teaching and research, and offers the 'Bachelor of Design - Urban Design' undergraduate course

No.	Activity type	What (Activity)	Role	How	Other Stakeholders	Timing	Funding
19.1	Communication	Sharing of data & knowledge across agencies and interagency collaboration	Participate	<ul style="list-style-type: none"> <li>Provide advice and share knowledge with other stakeholders</li> </ul>	(Lead: 6.5 DH) All agencies	Ongoing	
19.2	Planning / Awareness	Incorporate mosquito related issues into tertiary curriculum for Town Planners	Joint Lead	<ul style="list-style-type: none"> <li>Consult with relevant professional bodies / Institutions (Refer to DH information pack)</li> </ul>	(Joint Lead: 6.12 D, 16.3 Flinders & 18.5 Uni SA)	Planning / Awareness	
19.3	Research	Arbovirus reservoir and vector species/vector competence studies	Research Project		Other Agencies		Subject to funding provider
19.4	Research	Epidemiological studies of mosquito-borne diseases	Research Project	<ul style="list-style-type: none"> <li>Currently undertaking a study into RRV</li> </ul>	(Lead: DH 6.22 )		Subject to funding provider
19.5	Research	Viral analysis/monitoring of reservoir species and mosquito vectors	Research Project		(Joint Lead: 4.10 DEH & 6.23 DH) (9.6) PIRSA Uni's (16.7 & 18.11)		Subject to funding provider

## 20. Other Stakeholders

For the sake of completeness a list of other stakeholders that play a role in relation to mosquito management is detailed below.

### ***COUNTRY FIRE SERVICE***

- Provide response to extraordinary events (i.e. to consider mosquito management contingency plans when attending flooding events).

### ***EVENT COORDINATORS / TOURISM OPERATORS***

- Mosquito aware promotional activities prior to and at events (such as: availability of/need for repellents, advice on personal protection from mosquitoes via pamphlets/posters etc.)
- Targeted mosquito control – implement control measures prior to once-off public events to reduce the risk of exposure (such as: don't water lawns for a few days before the event, spray lawns etc.).

### ***EWATER COOPERATIVE RESEARCH CENTRE***

Water related research projects that may impact mosquito management, for example:

- Improve the effectiveness of research and development in water-related issues
- Develop programs and products to allow governments and private companies to deliver water of a higher quality by more efficient means
- Integrated water management across urban and rural catchments.

### ***HOSPITALS & MEDICAL PRACTITIONERS***

- Diagnose and treat persons suffering from arboviral infection, complete notifiable disease notification, and assist with investigations.

### ***MURRAY DARLING BASIN COMMISSION***

- Risk assessment of new and existing wetland areas, both natural and man-made.

### ***RESEARCH ORGANISATIONS***

- Immunisation and vaccine development (potential commercial benefits).

### ***SCHOOLS***

- Participating in monitoring of wetland areas, both natural and man-made.

## Appendix 1

*Sincere thanks to the members of the SAIMMS Working Group for their contribution to the project.*

### SAIMMS Working Group

NAME	POSITION	AGENCY
Andrew Triggs	Assistant Regional Manager	Australian Quarantine & Inspection Service (SA)
Peter Schultz	Scientific Officer	Patawalonga & Torrens Catchment Water Management Board
Greg Waller	LGA Representative (Director, Development & Environmental Services)	Local Government Association (City of Salisbury)
Glenn Shimmin	Senior Ecologist	Department for Environment & Heritage
Scott Douglas	Senior Project Officer	Strategic Planning, Planning SA
Peter Goonan	Biologist	Environment Protection Authority
Simon Benger	School of Geography	Flinders University
Allan McDougall	Training Officer	SA State Emergency Services
Hermann Rademeyer	Tourism Policy & Planning	South Australian Tourism Commission
John Darzanos	AIEH Representative (Manager, Environmental Health & Safety)	Australian Institute of Environmental Health – SA Branch (City of Salisbury)
John Kassebaum	Program Manager, Rural Chemicals	Primary Industries & Resources South Australia
Monique Blason	Land Management Officer	SA Water
Stephen Fricker	Research Officer, Mosquito Research Lab.	University of South Australia
Glen Scholz	Senior Ecologist	Department of Water, Land & Biodiversity Conservation
Rod Givney	Director, Communicable Diseases Control Branch	Department of Health
Ann Koehler	Consultant Microbiologist, Communicable Disease Control Branch	Department of Health
Craig Steel	Manager, Regional Services Section	Department of Health
Viv Greaves	A/Manager Environmental Services Section	Department of Health
Nicole Lewis	Scientific Officer, Environmental Services Section	Department of Health
Renay Cooke	Scientific Officer, Environmental Services Section	Department of Health
Amelia Southam	Scientific Officer, Environmental Services Section	Department of Health
Jeff Seidel	Field Officer, Environmental Services Section	Department of Health